BOTANY.—*Chelonocarpus, a new section of the genus Annona, with descriptions of* Annona scleroderma *and* Annona testudinea. W. E. Safford, Bureau of Plant Industry.

While on a mission for the United States Department of Agriculture, in April, 1902, Mr. Guy N. Collins of the Bureau of Plant Industry found at the railway station of Morales, not far from Puerto Barrios, Guatemala, a hard-shelled, globose custard-apple quite distinct from all Annona fruits hitherto known. He photographed two of the fruits, but was not able to secure flowers or leaves of the trees producing them. In February of the following year specimens of the same fruit together with herbarium specimens of the leaves were collected by Mr. Percy Wilson of the New York Botanical Garden near Puerto Sierra, Honduras, where the species occurred as a forest tree locally known as "Anona del monte," or wild Annona. One year later, in April, 1904, Mr. O. F. Cook collected fruits of a hard-shelled Annona very similar to the above species but oblate in form, broadly umbilicated and with the shell less regularly divided into polygonal areoles. At the same time Mr. Cook secured herbarium specimens including both leaves and flowers, the former differing somewhat in size and shape from those of the Honduras tree, tho of the same character, and the latter resembling the flowers of the section Atta, in shape, but with the receptacle and consolidated gynoecium so distinct as to further set apart the Guatemala species and its allies as a distinct group or section of the genus Annona. For this section I propose the name Chelonocarpus, suggested by the hard tortoiseshell-like surface of the fruit. On account of the complete nature of the material collected by Mr. Cook the species collected by him is made the type of the section.

Section Chelonocarpus

Hard-shell Custard-apple Group

Flowers in shape resembling those of the section Atta; peduncles clustered, usually issuing from the bark of old branches or stems (cauliflora); calyx gamosepalous, 3-lobed; receptacle (tor-

us) hemispherical or conoid, not clothed with hairs or bristles but with minute scale-like processes subtending the bases of the filaments in more or less vertical rows; corolla 3-petaled, the petals valvate, oblong or linear-oblong, the upper part triquetrous or keeled within, the lower part concave and swollen so as to include the essential parts; stamens with stout filaments bearing upon their back a pair of linear pollen sacs and terminating in an expanded minutely verrucose connective above them; carpels cohering firmly to form a solid gynoecium, with the outer ovaries minutely hirsute and the styles sharply articulated at the base and falling off soon after pollination has been effected; fruit (syncarpium) spheroid or conoid, composed of firmly consolidated one-seeded carpels inclosed in a thick rigid shell with the surface divided into rhomoboid or polygonal areoles by raised ridges; seeds smooth and glossy, oblong, somewhat compressed but not marginate, brown, or grayish brown to mouse-colored, surrounded by juicy pulp; leaves coriaceous, oblong, acuminate, with the midrib impressed above and raised beneath and the lateral nerves anastomosing before reaching the margin and connected by inconspicuous reticulating veins.

The species belonging to this section have been confused with the common custard-apple or bullock's heart (*A. reticulata* L.) and the chirimoya (*A. cherimola* Miller) from both of which they are easily distinguished by the large glossy seeds and the smooth, flat, coriaceous oblong leaves, as well as by the coherent nature of the gynoecium and the thickness of the rigid shell of the fruit. The two species here described may be broadly distinguished as follows:

Fruit oblate-spheroid in form, umbilicate; leaves not exceeding 9 inches (23 cm.) in length, abruptly acuminate ..... *Annona scleroderma*

Fruit globose in form, not umbilicate; leaves sometimes 1 foot (30 cm.) long, gradually acuminate *Annona testudinea*

In addition to these species it is probable that *A. Pittieri* Donnell Smith, from southern Costa Rica, should be assigned to this section, as the character of its leaves and flowers would in-

dicate. Its fruit is described as conoid and its leaves do not exceed 18 cm. in length.[1]

Annona scleroderma sp. nov. Hard-shell Custard-apple. Box-té of Guatemala.

A vigorous tree. Young growth minutely ferrugineous-pubescent. Leaf-blades oblong, abruptly acuminate, rounded at the base, 14 to 20 cm. long, 5.5 to 6 cm. broad, coriaceous, glabrous when mature, when young minutely ferrugineous-pubescent beneath, dark-green above, becoming olive-green when dry, midrib impressed above and raised beneath, lateral nerves not conspicuous, the parenchyma between them finely reticulate and punctate; petiole 14 to 18 mm. long grooved above in continuation of the median channel, when young minutely ferrugineous-pubescent, at length glabrate. Peduncles extra-axillary, usually in clusters of 3 or more issuing from the bark of old branches (cauliflora) with a small ovate bracteole below the middle and one at the base, appressed ferrugineous-pubescent like the young growth, about equal to the petioles in length. Flowers cinnamon-brown, appressed puberulent, calyx gamosepalous, 3-lobed, 6 to 6.5 mm. in diameter, minutely ferrugineous-pubescent on the outer surface; petals 3, valvate, closely cohering in the bud, the upper part linear or linear-oblong and triquetrous, the base swollen and concave closely covering the essential parts of the flower; inner petals wanting (in all specimens examined); receptacle conoid or hemispherical, not clothed with hairs or bristles between stamens as in many other species but with minute scale-like protuberences subtending the bases of the filaments, disposed in distinct almost vertical rows; gynoecium about 4 mm. in diameter, composed of firmly cohering carpels 2.3 mm. long with the outer ovaries clothed with appressed glossy rufous or chestnut-colored hairs; styles ovate to oblong, sharply articulated at the base, turning black and soon falling off after pollination has been effected; stamens 1.7 to 1.8 mm. long, with the stout filament light-yellow mottled with orange-red, and the swollen connective above the pollen sacs minutely verrucose, as seen under the microscope. Fruit depressed-globose, or oblate, broadly umbilicate, the surface of the thick rigid shell divided into angular areoles corresponding to the individual closely-cohering carpels by raised obtuse ridges; seeds oblong to oblong-obovate, somewhat compressed but not marginate, about 2 cm. long and 1 cm. broad, with the testa smooth and glossy, at length chocolate brown, endosperm ruminate, with the minute embryo embedded in its base; pulp juicy, not adhering to the seeds, pleasantly aromatic, with mango-like flavor, edible.

Type in the U. S. National Herbarium, No. 850041, collected at Cahabon, state of Alta Verapaz, Guatemala, April 20, 1904, by O. F. Cook (No. 89). Distribution: Mountains of Alta Verapaz, Guatemala, across the boundary into Mexico and as far north as Oaxaca.

[1] *A. Pittieri*, Donn. Sm., Bot. Gaz. **24**: 389. 1897.

EXPLANATION OF FIGURE 1. A cluster of unopened flowers, leaves, fruit, and seeds of *Annona scleroderma* natural size; and the torus marked with vertical rows of stamen-scars and bearing the cohering mass of carpels (gynoecium), enlarged 3 diameters. Drawn by Mr. J. M. Shull.

In addition to the type material, seeds sent in 1910 by Prof. Felix Foex to the U. S. Department of Agriculture from the state of Oaxaca belong very probably to this species (Seed collection No. 29316). In a note accompanying them Prof. Foex writes as follows: "These seeds came from a very interesting fruit of good size, good shape, pretty appearance, and having large seeds: the skin is thick as the shell of a coconut but not so hard; it resists well a pretty hard shock and pressure, and would be very good for packing and shipping."

Mr. O. F. Cook in his field-notes made the following entry: "The fruit called by the Kekchi Indians of Alta Verapaz box-té, or bosh-té, is curious rather than beautiful. The shell is divided into angular depressed areoles by raised ridges. When mature the ridges are dark brown and the areoles between them green. The pulp is readily separable into slender pyramids. These are normally 1-seeded, but in many cases they are seedless. The texture of the pulp is perfect, the flavor aromatic and delicious with no unpleasant aftertaste. It is much richer than the soursop, with a suggestion of the flavor of the zapote blanco, or matasano (*Casimiroa edulis*), but not in the least objectionable. It can be eaten most conveniently with a spoon. The most fragrant pulp is close to the rind. The seeds separate from the surrounding pulp more readily than in most annona fruits."

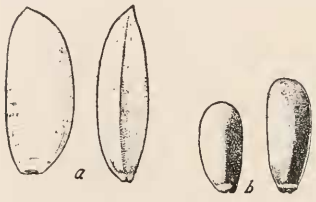

Fig. 3. Seeds of *Annona testudinea*, *a*, compared with seeds of *A. reticulata*, *b*, with which the present species has hitherto been confused.

Annona testudinea sp. nov. Tortoiseshell Custard-apple. Anona del Monte of Honduras.

A forest tree 12 to 15 meters high. Leaf-blades oblong or oblong-elliptical, acuminate at the apex, abruptly cuneate or rounded at the base and usually decurrent on the petiole, those near the base of branch sometimes retuse or rounded at the apex, as in the case of many other species of Annonaceae, 25 to 35 cm. long and 7.5 to 9 cm. broad, coriaceous, smooth and flat with the midrib impressed above and very prominent beneath; lateral nerves not prominent, connected by inconspicuous anastomosing veins; petiole rather long (22 to 25 mm.), at length glabrous, grooved above. Flowers not observed. Fruit globose, hard-shelled, 8 to 9 cm, in diameter, its surface divided into polygonal areoles by raised ridges, suggesting tortoiseshell in its general appearance. Seeds 20 to 22 mm. long and 10 to 12 mm. broad, sometimes elliptical in cross-section or slightly compressed with one or both edges sharp-cornered but not marginate, testa smooth and glossy, light-brown or

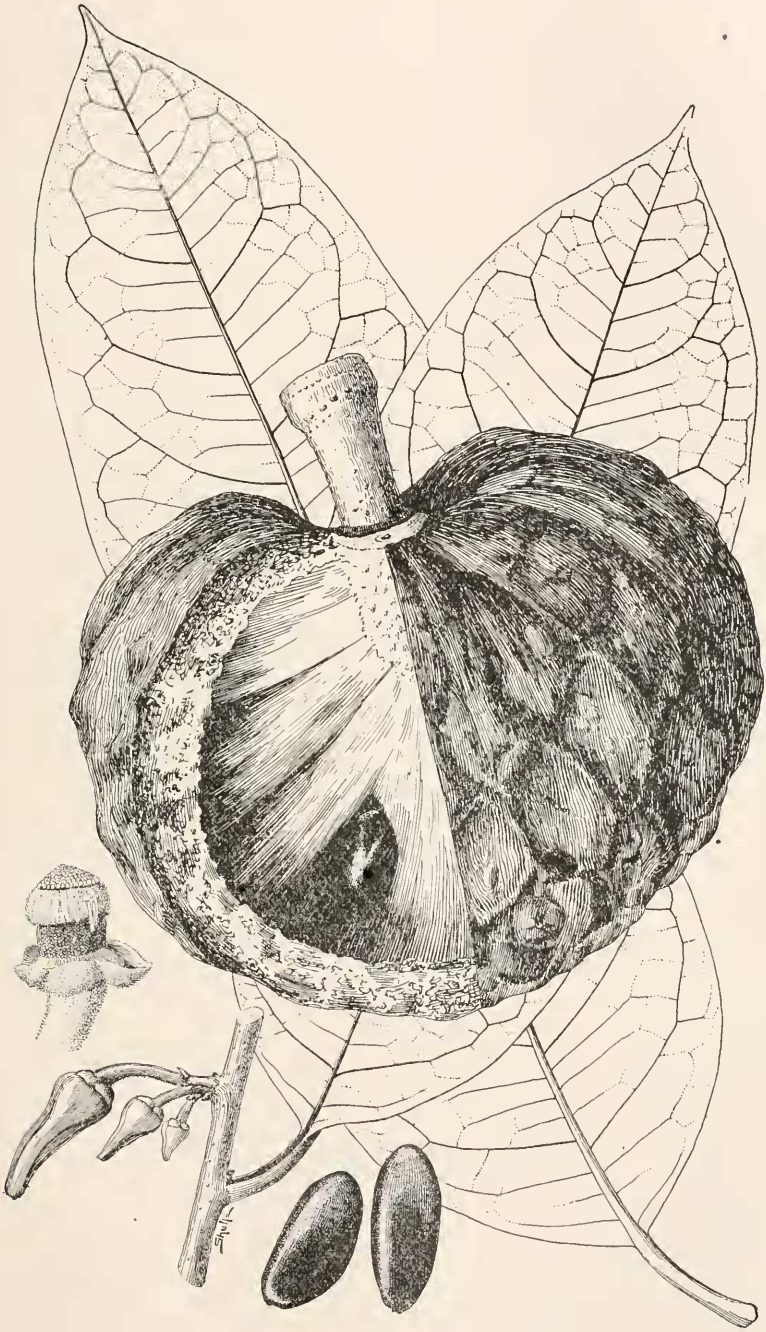

Fig. 1. Annona scleroderma Safford.

mouse-colored, faintly revealing the transverse wrinkels of the ruminate endosperm; pulp very juicy, aromatic, edible.

Type in the Herbarium of John Donnell Smith, collected in the forest near Puerto Sierra, Honduras, February 7, 1903, by Percy Wilson (No. 351). Specimens examined: Material from the type collection in the Herbarium of the New York Botanical Garden and the Donnell Smith Herbarium, Baltimore, Maryland; also photographs of fruits purchased at Morales, Guatemala, not far from Puerto Barrios, April 6, 1902, by Mr. Guy N. Collins (No. 3833).

Explanation of Figure 2. *Annona testudinea,* from type material, natural size, showing a typical acuminate leaf and a basal leaf with retuse apex. Drawn by Mr. Ivan M. Fitzwater.

The fruit, as described by Mr. Collins in his field notes, "has a shell about one-eighth of an inch thick, which breaks with almost a fracture, with a fleshy core [receptacle] reaching from the base nearly to the center of the fruit. The pulp of the ripe fruit is rich, soft, and watery, with only a faint suggestion of the sandiness noted in the Annona observed at Sepacuité [*A. reticulata* L.], very aromatic and with a slight pine-like flavor, turning brown when perfectly ripe and not adhering to the seeds. The color of the outer surface is grayish or bluish green, somewhat pruinose, becoming purplish at maturity." According to Mr. Percy Wilson, the fresh leaves are dark green above and paler beneath. The tree, known locally as "anona del monte," or wild custard-apple, is highly esteemed by the natives for its fruit. The latter is green-ridged with brown seeds having the odor of turpentine when cut, and with good edible pulp, which is easily separable.

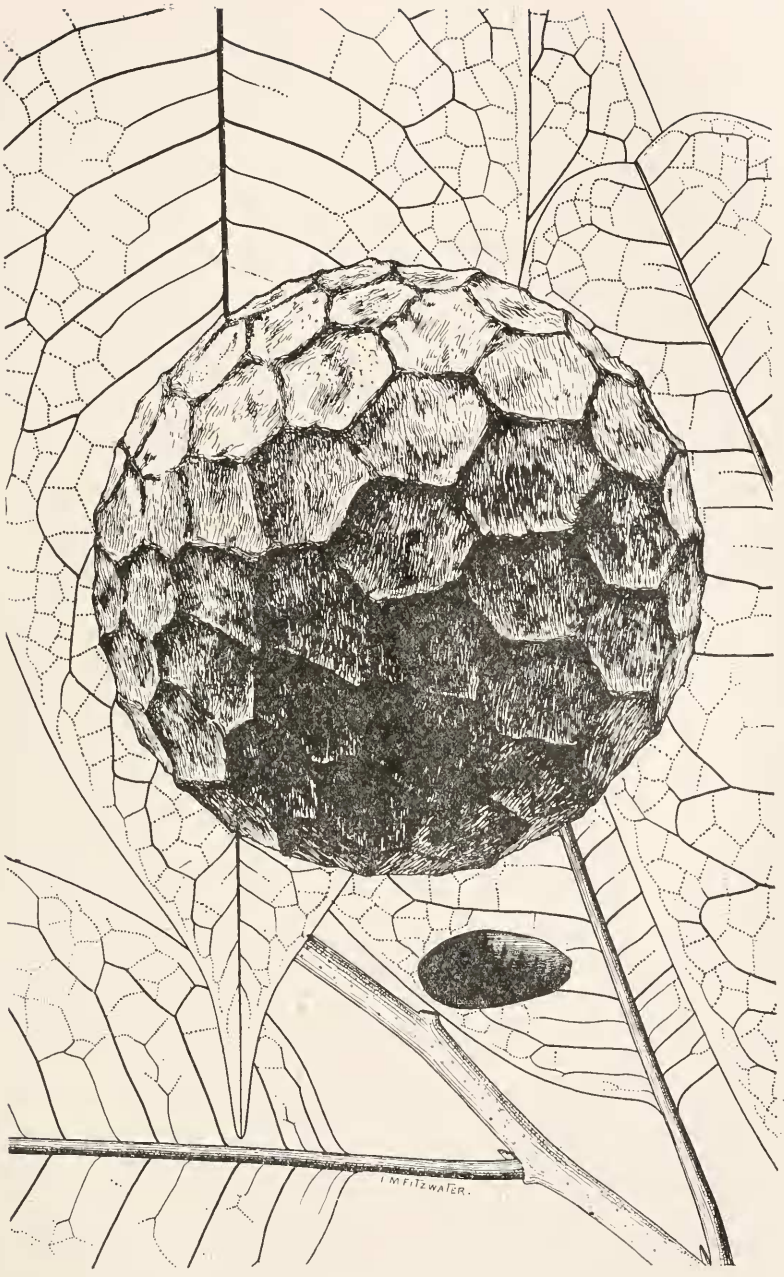

Fig. 2. Annona testudinea Safford.